Patent Application

of

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for

METHOD FOR PRODUCING A FOAM ELEMENT, ESPECIALLY A FOAM PADDING ELEMENT FOR A PLANE OR VEHICLE SEAT

Field of the Invention

The present invention relates to a method for producing a foam element, especially a foam padding element for a plane or vehicle seat. A layer of material is applied to at least one shaping wall section of a foaming mold. The material layer, during the foaming process, forms a barrier layer between the foam material and the relevant wall section.

Background of the Invention

Methods of forming a foam padding seat element with a barrier layer are already known. The barrier layer prevents direct engagement of the foam material with the shaping wall of the foaming mold to simplify removal from the mold. Also, caking or baking onto the shaping wall is prevented in the area of the barrier layer. However, problems arise with the application of such a layer forming the barrier layer and with its fixation to the shaping wall. Because of the application of the forces working during the foaming process on the shaping wall section, the danger exists of displacement of the layer inserted into and embedded in the mold. Also, the danger exists of formation of folds. Among other things, surface defects or flaws arise on the foam element being produced.

Summary of the Invention

Objects of the present invention are to provide a method of forming a foam element with a barrier layer which is simple to perform and leads to improved properties in the products obtained by the method. Other objects of the present invention are to provide a foam element produced by this method.

According to the present invention, a fleece with ferromagnetic coating is used as the layer forming the barrier layer. The fleece is held in its position detachably on the mold wall section by means of a cooperating device producing a magnetic field.

The use of a ferromagnetically coated fleece according to the present invention provides a plurality of remarkable advantages. The embedding into the foaming mold is set up to be very simple. The fleece need only be engaged on the wall of the foaming mold, on which it is held in position by the cooperation of the ferromagnetic coating with the magnetic field being generated on the relevant wall section. To produce the magnetic field, permanent magnets are provided, preferably in suitable layer arrangement on the foaming mold. The fleece fits snugly with its ferromagnetic coating without forming folds on the shaping wall. As required, it is fitted to a contoured strip of the relevant wall section. The layer of fleece remains held in place by the magnetic holding forces during the foaming process.

While the ferromagnetic coating of the fleece engaging on the wall section of the foaming mold forms a good foam barrier, in other words a very effective protection layer against the wearing through of foam material on the wall section, the reverse side of the fleece is free of coating and thereby facilitates a good binding with the foam element produced during the foam process. The good binding is by penetration of the foam material into the structure of the fleece. This fleece is thus fastened securely to the relevant surface area of the foam element by means of the foaming attachment. In this relationship, the method of the present invention is suitable in a special manner for the production of foam padding parts for seats, in which mechanical devices are built into or built on the reverse or interior side of the relevant foam padding part. The mechanical devices are, for example, operating devices for seat or backrest adjustment and/or for the adjustment of headrests relative to backrests. The fleece fastened to the relevant surface areas of the foam padding part with its ferromagnetic coating forms a friction-free protection layer to counter wearing through of the foam part by the relevant mechanical parts.

Preferably, a composition is used for the ferromagnetic coating. The composition includes 80 parts polyurethane and 20 parts ferrite powder processed with a binding agent into an easily spreadable mass of material. This material is preferably wiped on by means of a blade or coating nozzle forming a strip on a relevant carrier moved relative to the applicator.

With this arrangement, the fleece to be coated in turn can be used as the carrier. The easily spreadable material is spread directly thereon.

Alternatively, a strip of a silicon-coated carrier (e.g. paper or foil) can be moved relative to the applicator, and thus, can be provided with the coating. In this case, the coated carrier together with a strip of the fleece, while being supported, is guided through a laminating arrangement. The coating of the carrier is applied by lamination on the fleece. Following separation of the strips of the carrier and the fleece carrying the coating, the carrier can be rolled up to be used again for another coating process.

Other objects, advantages and salient features of the present invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses preferred embodiments of the present invention.

Brief Description of the Drawings

Referring to the drawings which form a part of this disclosure:

Figure 1 is a side perspective view of a frontal support part of a vehicle seat back rest according to the present invention;

Figure 2 is an rear elevational view of the foam padding element of Figure 1;

Figure 3 is a diagrammatically simplified side elevational view of an apparatus or device for producing a coated fleece during performance of the method according to a first embodiment of the present invention; and

Figure 4 is a side elevational view of an apparatus or device for producing a coated fleece according to a second embodiment of the present invention.

Detailed Description of the Invention

Fig. 1 shows a foam element 1 in the form of a foam padding element for a vehicle seat. The foam padding element is configured as the front part of a backrest support with its forward side 3 incorporating a shape ergonomically suitable for the support of the back of the rider in the seat. On its reverse side or back 5, the foam element 1 forms a depression in the form of a shallow saucer. The depression is intended to receive the mechanisms associated with the backrest. Such mechanisms include the supporting metal frame as well as the operation and adjustment devices, for example for the height adjustment of the headrest. The support rods of the headrest height adjustment extend upward through the top part of foam element 1. The "mechanisms" are not shown in the drawing.

As is especially clear in Fig. 2, the base of the saucer-like depression on reverse side 5 is covered by a fleece 7. During the foaming process, the fleece is attached by foaming onto the relevant surface of foam element 1. The exposed exterior of fleece 7 has a ferromagnetic coating 9. Ferrite particles are added to coating 9. In the present example, coating 9 is a layer of a polyurethane, and, on the exposed exterior of fleece 7, forms a smooth, thick and friction-free layer. During the foaming process, coating 9 engages on the shaping wall of the foaming mold, where it serves as a foam barrier. The foam material, in cooperation with the free reverse side of fleece 7, can indeed attain a good binding. The foam material is prevented by coating 9 from

direct contact with the shaping wall. Thus, any caking or baking of the foam material onto the shaping wall is avoided and the shaping of the foam element is simplified.

Because of the ferromagnetic property of coating 9, the fleece 7 following embedding in the foaming mold can be secured and engaged on the mold shaping wall by means of a suitable magnet arrangement which can provide security. A thrusting, folding, warping or twisting of the fleece by the forces generated during the foaming process is therefore avoided, without the provision of special holding means on the shaping wall of the foaming mold. Strips of permanent magnets can be provided to serve as the magnet arrangement. The magnets can be arranged along the edges of fleece 7 on the exterior of the foaming mold.

Fleece 7, as shown in Figs. 1 and 2, is foamed on foam element 1 such that coating 9 is turned toward or faces the mechanism mounted in the backrest of the relevant vehicle seat. Coating 9 forms a smooth, low-friction and wear-resistant layer, and therefore, provides protection against wearing through of the surface of foam element 7 by parts of the mechanism as a result of their vibrations or as a result of operational movements of corresponding mechanism parts.

Figs. 3 and 4 show in detail two different methods for production of fleece 7 with ferromagnetic coating 9. In both cases, the basic fleece material is a non-coated PET-fleece 11 of 20 to 60 g/m^2, and preferably approximately 40 g/m^2, to which is applied the 60 to 100 g/m^2, and preferably approximately 80 g/m^2, of ferromagnetic coating 9. This coating is applied as spreadable material by wiping on with an applicator. This material can, for example, be a mixture of 80 parts polyurethane SU 4715 (Firma Stahl) or some similar polyurethane material with the addition of 20 parts ferrite powder of granular size 10 microns. Butamon is used as a diluting medium to process the mixture into an easily spreadable mass of material of approximately 3000 mPa · s.

In the embodiment shown in Fig. 3, the easily spreadable mass forming coating 9 is applied directly on a strip of the non-coated fleece 11. The fleece is unwound from a supply roll. The strip of non-coated fleece 11 is carried through a coating device or station. In the example shown, the coating station has an applicator 13. The strip of fleece 7 with the applied and still

wet coating 9 is then carried through a dryer 15. Following drying of coating 9, the coated fleece is rolled up into a roll 17a.

Fig. 4 shows a modified process in which the easily spreadable material forming coating 9 is not applied directly by means of the applicator onto non-coated PET-fleece 11. Rather, a silicon-coated carrier or support 17, for example in the form of a strip of paper or foil, is conveyed from a supply roll 19 to applicator 13. Following application of coating 9 on support 17, the coated support with the strip of non-coated PET-fleece 11 is fed to a calendar arrangement 21. In the calendar arrangement, coating 9 is transmitted from carrier 17 onto fleece 11 by the coating on of a lamina. Subsequently, the strips of carrier 17 and fleece 7 having coating 9 applied thereon pass through the dryer 15. Following passing through dryer 15, carrier 17 is separated from coated fleece 7 and is rolled separately into a roll 23. Coated fleece 7 is rolled into the roll 25. The carrier rolled into roll 23 can be used again, in other words for another manufacturing process for which it can replace the supply roll 19, when this roll is depleted.

While various embodiments have been chosen to illustrate the invention, it will be understood by those skilled in the art that various changes and modifications can be made therein without departing from the scope of the invention as defined in the appended claims.